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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/054,652	01/18/2002	Thomas B. Pritchard	10016350 - 1	9419

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Intellectual Property Administration
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EXAMINER

MILIA, MARK R

ART UNIT	PAPER NUMBER
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2625

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/054,652

Applicant(s)

PRITCHARD, THOMAS B.

Examiner

Mark R. Milia

Art Unit

2625

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 March 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 29 and 30 is/are allowed.
- 6) ☒ Claim(s) 1-28 and 31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/2/07 has been entered. Currently, claims 1-31 are pending.

Response to Arguments

2. Applicant's arguments filed 3/2/07 have been fully considered but they are not persuasive.

Applicant asserts that the reference of Metaxas (US 6307978) does not disclose "partitioning a group of pixels, corresponding to a group of values, into a first plurality of columns including the pixels forming the group of pixels, with individual of the first plurality of columns including a second plurality of columns and with each of the ones of the first plurality of columns including a plurality of rows of the pixels". The examiner respectfully disagrees as Metaxas does disclose such features. Particularly, Metaxas states that image data is a matrix having n rows and m columns (see column 3 lines 57-

Art Unit: 2625

60). In a first embodiment, Metaxas discloses a method of processing the image matrix along a diagonal front and in a second embodiment, Metaxas discloses modifying the image matrix utilizing pixel shifting to process the image data (see Figs. 8-14 and column 7 lines 1-52). Figure 10 specifically shows that the image matrix is partitioned into a group of pixels, into a first plurality of columns including the pixels forming the group ($P_{0,6,0}-P_{0,6,4}$), with individual of the first plurality of columns including a second plurality of columns (each first plurality of columns contains three columns of pixels) and with each of the ones of the first plurality of columns including a plurality of rows of the pixels ($P_{0,0,4}-P_{6,0,4}$). Further, although Metaxas discloses, in the first embodiment, processing the image matrix along a diagonal front, the image matrix is still partitioned into a plurality of columns including a plurality of rows and a plurality of processors are utilized to halftone the image data quickly and efficiently. Still further, paragraph 24 of the specification of the instant invention states that other partition orientations and boundaries can be used to process the image data and the error diffusion halftoning can be performed right to left and top to bottom, left to right and bottom to top, or right to left and bottom to top.

Therefore, Metaxas still anticipates claims 1-26 and 31, as set forth in the previous Office Action.

Claim Rejections - 35 USC § 102

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 1-26 and 31 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6307978 to Metaxas.

Regarding claim 1, Metaxas discloses a method, comprising: partitioning a group of pixels, corresponding to a group of values, into a plurality of columns including the pixels forming the group of pixels, with individual of the first plurality of columns including a second plurality of columns and with each of the ones of the plurality of columns including a plurality of rows of the pixels (see Figs. 3, 4, and 10, column 3 lines 36-38, column 4 lines 2-24, and column 7 lines 1-52), halftoning a first plurality of values, corresponding to a first one of the plurality of rows in a first one of the first plurality of columns, to form a first plurality of error terms (see Figs. 3 and 4, column 4 lines 7-24, and column 7 lines 1-52), and halftoning, using at least one of the first plurality of error terms, on a second plurality of values corresponding to a second one of the plurality of rows in a second one of the first plurality of columns, after completion of the halftoning on the first plurality of values, to form a second plurality of error terms (see Figs. 3 and 4, column 4 lines 2-24 and 30-47, and column 7 lines 1-52).

Regarding claim 9, Metaxas discloses an apparatus, comprising: a first processing device to perform halftoning on a first set of values corresponding to a first set of pixels forming a first column, including a first plurality of columns, with the first

Art Unit: 2625

column included in a second plurality of columns formed from partitioning a group of pixels forming an image (see Fig. 3 and 10, column 4 lines 2-6 and column 7 lines 1-52), a second processing device to perform halftoning on a second set of values corresponding to a second set of pixels forming a second column included in the second plurality of columns, with ones of the first set of pixels located adjacent to the second set of pixels and with ones of the second set of pixels located adjacent to the first set of pixels (see Fig. 3 and 10, column 4 lines 2-6, and column 7 lines 1-52), and a bus arranged for transferring a third set of values, from the halftoning of ones of the first set of values corresponding to the ones of the first set of pixels, to the second processing device and for transferring a fourth set of values, from the halftoning of ones of second set of values corresponding to the ones of the second set of pixels, to the first processing device (see column 4 lines 2-24 and column 6 lines 61-65).

Regarding claim 31, Metaxas discloses a halftoning apparatus, comprising: first means for halftoning on a first set of values corresponding to a first set of pixels partitioned from a group of pixels forming an image to form a first column, with the first column included as a first one of a plurality of columns formed from partitioning the group of pixels (see Fig. 3 and 10, column 4 lines 2-6, and column 7 lines 1-52), second means for halftoning on a second set of values corresponding to a second set of pixels partitioned from the group of pixels forming an image to form a second column, with the second column included as a second one of the plurality of columns and with ones of the first set of pixels located adjacent to the second set of pixels and with ones of the second set of pixels located adjacent to the first set of pixels (see Fig. 3 and 10, column

4 lines 2-6, and column 7 lines 1-52), and means for transferring arranged to transfer a third set of values, from the halftoning of ones of the first set of values corresponding to the ones of the first set of pixels, to the second means for halftoning and for transferring a fourth set of values, from the halftoning of ones of second set of values corresponding to the ones of the second set of pixels, to the first means for halftoning (see column 4 lines 2-24 and column 6 lines 61-65).

Regarding claim 2, Metaxas further discloses wherein the first one of the plurality of columns and the second one of the first plurality of columns include equal numbers of the pixels (see Fig. 4 and 10).

Regarding claim 3, Metaxas further discloses wherein the first one of the first plurality of columns exists adjacent to the second one of the first plurality of columns within an image formed by the first plurality of columns (see Figs. 3, 4, and 10) and a boundary at an interface between the first one of the first plurality of columns and the second one of the first plurality of segments forms a substantially straight line within the image (see Figs. 3, 4, and 10, a substantially straight line exists between the plurality of segments in a diagonal orientation).

Regarding claim 4, Metaxas further discloses wherein the boundary exists substantially perpendicular to the plurality of rows of the pixels (see Figs. 3, 4, and 10).

Regarding claim 5, Metaxas further discloses wherein the first one of the plurality of rows and the second one of the plurality of rows exist in alignment within the image (see Fig. 3 and 10 and column 2 lines 23-32).

Regarding claims 6, 10, and 18, Metaxas further discloses wherein the halftoning includes error diffusion halftoning (see Fig. 3, column 3 lines 36-47, and column 4 lines 2-24).

Regarding claim 7, Metaxas further discloses wherein halftoning of ones of the plurality of rows in the first one of the first plurality of columns, other than the first one of the plurality of rows, occurs contemporaneously with halftoning of ones of the plurality of rows in the second one of the first plurality of columns, other than the second one of the plurality of rows (see Figs. 3, 4, and 10, column 4 lines 2-24, and column 7 lines 1-52)

Regarding claim 8, Metaxas further discloses the first one of the first plurality of columns includes ones of the pixels included in the second ones of the first plurality of columns (see Figs. 3, 4, and 10).

Regarding claim 11, Metaxas further discloses wherein the third set of values includes error terms generated from the error diffusion halftoning of the ones of the first set of pixels (see Figs. 3 and 4 and column 4 lines 2-24), and the fourth set of values includes error terms generated from the error diffusion halftoning of the ones of the second set of pixels (see Figs. 3 and 4 and column 4 lines 2-24).

Regarding claim 12, Metaxas further discloses wherein the first set of pixels and the second set of pixels each include equal numbers of the pixels, with the first set of pixels and the second set of pixels included within an image (see Figs. 3 and 4, column 2 lines 23-32, and column 4 lines 2-24), and with the ones of the first set of pixels adjacent to the ones of the second set of pixels within the image (see Figs. 3 and 4 and column 4 lines 2-24).

Regarding claim 13, Metaxas further discloses wherein a boundary at an interface between the ones of the first set of pixels and the ones of the second set of pixels forms a substantially straight line within the image (see Figs. 3, 4, and 10, a substantially straight line exists between the plurality of segments in a diagonal orientation).

Regarding claim 14, Metaxas further discloses wherein the first set of pixels includes a spatial arrangement into a first plurality of rows forming a first segment of the image (see Figs. 3, 4, and 10, column 4 lines 2-24, and column 7 lines 1-52) and the second set of pixels includes a spatial arrangement into a second plurality of rows forming a second segment of the image, with the ones of the first set of pixels forming the first column adjacent to the second column formed from the ones of the second set of pixels, with the boundary at the interface between the first column and the second column (see Figs. 3, 4, and 10, column 4 lines 2-24, and column 7 lines 1-52).

Regarding claim 15, Metaxas discloses wherein the first plurality of rows includes a first row located on a first edge of the first column and the second plurality of rows includes a second row located on a second edge of the second column, with the first row aligned with the second row in the image (see Figs. 3, 4, and 10) and the first processing device includes a configuration to complete the error diffusion halftoning on the first row before the second processing device begins the error diffusion halftoning on the second row (see Figs. 3, 4, and 10, column 4 lines 2-24, and column 7 lines 1-52).

Regarding claim 16, Metaxas further discloses wherein the first plurality of rows includes a third row located adjacent to the first row in the first column (see Fig. 4 and 10), the second plurality of rows includes a fourth row located adjacent to the second row in the second column (see Fig. 4 and 10), the second processing device includes a configuration to begin the error diffusion halftoning on the second row before the first processing device completes the error diffusion halftoning on the third row (see Fig. 4 and 10), and the first processing device includes a configuration to complete the error diffusion halftoning on the third row before the second processing device begins the error diffusion halftoning on the fourth row (see Fig. 4 and 10).

Regarding claim 17, Metaxas further discloses wherein the first processing device includes a first halftone processor and the second processing device includes a second halftone processor (see column 3 lines 36-38, and column 4 lines 2-6).

Regarding claim 19, Metaxas further discloses a third processing device to perform halftoning on a fifth set of values corresponding to a third set of pixels (see Figs. 3, 4, and 10), and a fourth processing device to perform halftoning on a sixth set of values corresponding to a fourth set of pixels, with ones of the third set of pixels located adjacent to the fourth set of pixels, with ones of the fourth set of pixels located adjacent to the third set of pixels, and with the bus coupled to the third processing device and the fourth processing device for transferring a seventh set of values, from the halftoning of the ones of the third set of pixels to the fourth processing device, and for transferring an eighth set of values, from the halftoning of the ones of the fourth set of pixels, to the

Art Unit: 2625

third processing device (see Figs. 3, 4, and 10, column 4 lines 2-24 and 30-47, and column 7 lines 1-52).

Regarding claim 20, Metaxas further discloses wherein the third set of values includes error terms generated from the error diffusion halftoning of the ones of the first set of pixels (see Figs. 3, 4, and 10, column 4 lines 2-24, and column 7 lines 1-52), the fourth set of values includes error terms generated from the error diffusion halftoning of the ones of the second set of pixels (see Figs. 3, 4, and 10, column 4 lines 2-24, and column 7 lines 1-52), the seventh set of values includes error terms generated from the error diffusion halftoning of the ones of the third set of pixels (see Figs. 3, 4, and 10, column 4 lines 2-24, and column 7 lines 1-52), and the eighth set of values includes error terms generated from the error diffusion halftoning of the ones of the fourth set of pixels (see Figs. 3, 4, and 10, column 4 lines 2-24, and column 7 lines 1-52).

Regarding claim 21, Metaxas further discloses wherein the first set of pixels, the second set of pixels, the third set of pixels, and the fourth set of pixels each include equal numbers of pixels, with the first set of pixels, the second set of pixels, the third set of pixels, and the fourth set of pixels included within an image (see column 2 lines 23-32).

Regarding claim 22, Metaxas further discloses wherein a first boundary formed at a first interface between the ones of the first set of pixels and the ones of the second set of pixels forms a substantially straight line within the image (see Fig. 4 and 10) and a second boundary formed at a second interface between the ones of the third set of

pixels and the ones of the fourth set of pixels forms the substantially straight line within the image (see Fig. 4 and 10).

Regarding claim 23, Metaxas further discloses wherein the first set of pixels includes a spatial arrangement into a first plurality of rows forming the first column (see Figs. 3, 4, and 10, column 4 lines 2-24, and column 7 lines 1-52), the second set of pixels includes a spatial arrangement into a second plurality of rows forming the second column, with the ones of the first set of pixels forming the first column adjacent to the second column formed from the ones of the second set of pixels, with the first boundary at the interface between the first column and the second column (see Figs. 3, 4, and 10, column 4 lines 2-24, and column 7 lines 1-52), the third set of pixels includes a spatial arrangement into a third plurality of rows forming a third column (see Figs. 3, 4, and 10, column 4 lines 2-24, and column 7 lines 1-52), and the fourth set of pixels includes a spatial arrangement into a fourth plurality of rows forming a fourth column, with the ones of the third set of pixels forming the third column adjacent to the fourth column formed from the ones of the fourth set of pixels, with the second boundary at the interface between the third column and the fourth column (see Figs. 3, 4, and 10, column 4 lines 2-24, and column 7 lines 1-52).

Regarding claim 24, Metaxas further discloses wherein the first plurality of rows includes a first row located on a first edge of the first column, the second plurality of rows includes a second row located on a second edge of the second column, the third plurality of rows includes a third row located on a third edge of the third column, the fourth plurality of rows includes a fourth row located on a fourth edge of the fourth

column, with the first row, the second row, the second row, the third row, and the fourth row aligned within the image (see Figs. 3, 4, and 10, column 3 lines 45-47, column 4 lines 2-24, and column 7 lines 1-52), the first processing device includes a configuration to complete the error diffusion halftoning on the first row before the processing device begins the error diffusion halftoning on the second row (see Figs. 3, 4, and 10, column 3 lines 45-47, column 4 lines 2-24, and column 7 lines 1-52), the processing device includes a configuration to complete the error diffusion halftoning on the second row before the processing device begins the error diffusion halftoning on the third row (see Figs. 3, 4, and 10, column 3 lines 45-47, column 4 lines 2-24, and column 7 lines 1-52), and the processing device includes a configuration to complete the error diffusion halftoning on the third row before the processing device begins the error diffusion halftoning on the fourth row (see Figs. 3, 4, and 10, column 3 lines 45-47, column 4 lines 2-24, and column 7 lines 1-52).

Regarding claim 25, Metaxas further discloses wherein the first set of pixels includes a third set of pixels and the second set of pixels includes the third set of pixels, with the ones of the first set of pixels located adjacent to the third set of pixels and the ones of the second set of pixels located adjacent to the third set of pixels (see Fig. 4 and 10).

Regarding claim 26, Metaxas further discloses wherein the processing device includes a configuration to transfer a fifth set of values, corresponding to a first subset of pixels of the third set of pixels included within the first set of pixels, to the second processing device using the bus (see Figs. 3, 4, and 10, column 4 lines 2-24, and

Art Unit: 2625

column 7 lines 1-52), the processing device includes a configuration to transfer a sixth set of values, corresponding to a second subset of pixels of third set of pixels included within the second set of pixels, to the first processing device using the bus (see Figs. 3, 4, and 10, column 4 lines 2-24, and column 7 lines 1-52), the processing device includes a configuration to perform the error diffusion halftoning on the sixth set of values (see Figs. 3, 4, and 10, column 4 lines 2-24, and column 7 lines 1-52), and the processing device includes a configuration to perform the error diffusion halftoning on the fifth set of values (see Figs. 3, 4, and 10, column 4 lines 2-24, and column 7 lines 1-52).

Claim Rejections - 35 USC § 103

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

6. Claims 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6870642 to Ostromoukhov in view of Metaxas (US 6307978).

Regarding claim 27, Ostromoukhov discloses an imaging device, comprising: an interface arranged to receive data, corresponding to an image, from a computer (see Figs. 3-5 and column 4 lines 50-65), a processor configured to generate color values, corresponding to pixels forming the image, using the data received from the interface (see column 5 lines 55-60), a processing system arranged to receive the color values and including a processing device to perform halftoning on a first set of values, included

Art Unit: 2625

in the color values, corresponding to a first set of pixels included in the pixels forming the image to form a first set of halftone values (see column 6 lines 56-67), a processing device to perform halftoning on a second set of values, included in the color values, corresponding to a second set of pixels included in the pixels forming the image to form a second set of halftone values (see column 6 lines 37-67), with ones of the first set of pixels located adjacent to the second set of pixels and with ones of the second set of pixels located adjacent to the first set of pixels (see column 6 lines 37-67), an image forming mechanism configured to form the image using the first set of halftone values and the second set of halftone values (see column 5 lines 4-12), and memory to store the color values, the first set of halftone values, and the second set of halftone values (see column 7 lines 1-3).

Ostromoukhov does not disclose expressly a first set of pixels forming a first column, with the first column included as a first one of a plurality of columns formed from partitioning the pixels forming the image into the plurality of columns and a second set of pixels forming a second column, with the second column included as a second one of the plurality of columns and a first processing device and a second processing device and a bus coupling the first processing device and the second processing device for transferring a third set of values from the halftoning of the ones of the first set of pixels to the second processing device and for transferring a fourth set of values from the halftoning of the ones of the second set of pixels to the first processing device.

Metaxas discloses a first set of pixels forming a first column, with the first column included as a first one of a plurality of columns formed from partitioning the pixels

Art Unit: 2625

forming the image into the plurality of columns and a second set of pixels forming a second column, with the second column included as a second one of the plurality of columns (see Fig. 3 and 10) and a first processing device and a second processing device (see column 4 lines 2-6 and column 7 lines 1-52) and a bus coupling the first processing device and the second processing device for transferring a third set of values from the halftoning of the ones of the first set of pixels to the second processing device and for transferring a fourth set of values from the halftoning of the ones of the second set of pixels to the first processing device (see column 4 lines 2-24, column 6 lines 61-65, and column 7 lines 1-52).

Ostromoukhov & Metaxas are combinable because they are from the same field of endeavor, halftoning using error diffusion.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to combine multiple processors and transferring of values, as described by Metaxas, with the system of Ostromoukhov.

The suggestion/motivation for doing so would have been to provide a faster and less time consuming process for halftoning images (see column 1 lines 41-46 of Metaxas).

Therefore, it would have been obvious to combine Metaxas with Ostromoukhov to obtain the invention as specified in claim 27.

Regarding claim 28, Metaxas further discloses wherein the halftoning includes error diffusion halftoning (see column 3 lines 36-38, column 4 lines 2-24, and column 7

Art Unit: 2625

lines 1-52), the third set of values includes error terms generated from the error diffusion halftoning of the ones of the first set of pixels (see Figs. 3, 4, and 10, column 3 lines 36-38, column 4 lines 2-24, and column 7 lines 1-52), the fourth set of values includes error terms generated from the error diffusion halftoning of the ones of the second set of pixels (see Figs. 3, 4, and 10, column 3 lines 36-38, column 4 lines 2-24, and column 7 lines 1-52), the first set of pixels and the second set of pixels each include equal numbers of the pixels, with the first set of pixels and the second set of pixels and with the ones of the first set of pixels adjacent to the ones of the second set of pixels within the image (see Figs. 3, 4, and 10, column 3 lines 36-38, column 4 lines 2-24, and column 7 lines 1-52), and a boundary at an interface between the ones of the first set of pixels and the ones of the second set of pixels forms a substantially straight line within the image (see Figs. 3, 4, and 10, column 3 lines 36-38, column 4 lines 2-24, and column 7 lines 1-52).

Allowable Subject Matter

1. Claims 29 and 30 are allowed. The reasons for the indication of allowable subject matter have been set forth in the previous Office Action.

Conclusion

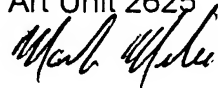
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark R. Milia whose telephone number is (571) 272-7408. The examiner can normally be reached M-F 8:00am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Twyler M. Lamb can be reached at (571) 272-7406. The fax number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MRM

Mark R. Milia
Examiner
Art Unit 2625



TWYLER LAMB
SUPERVISORY PATENT EXAMINER